

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: M. OOE, et al.
Serial No.: 10/585,738
Filed: JULY 12, 2006
For: PHOTSENSITIVE POLYMER COMPOSITION, METHOD OF
PRODUCING PATTERN AND ELECTRONIC PARTS
Group AU: 1794
Examiner: Gerard T. Higgins
Confirm. No.: 7230

PROPOSED DECLARATION UNDER 37 CFR 1.132

Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

SIR:

I, Masayuki Ooe, a citizen of Japan, residing at 2-24-6, Juou-cho, Hitachi City,
Ibaraki, Japan,

DECLARE THAT:

1. I graduated in 1987 from the School of Interdisciplinary Science and Engineering in the Graduate School of Kyushu University, Department of Molecular Engineering;
2. I joined Hitachi Chemical Co., Ltd. in October 1996, and transferred to Hitachi Chemical DuPont Microsystems Ltd. in November 1997, and my present area of research is investigation into development and mass production of new photosensitive, alkali-developed, positive-type polyimides and polybenzoxazoles;
3. I am one of the inventors named in U.S. Patent Application No. 10/585,738, filed July 12, 2006 (hereinafter "the above-identified

application"), and I am familiar with the Office Action mailed April 14, 2009, therein;

4. I conducted the following comparative experiments to investigate the proper exposure amount and, therefore, sensitivity of photosensitive polymer compositions containing a polyamide (component (a)) and a compound which generates an acid upon receiving light (component (b)) within the scope of claim 1 in the Amendment filed February 17, 2009, in the above-identified application, but containing a compound (c) outside the scope of claim 1 in this Amendment filed February 17, 2009, and described in Examples 1 and 3 of JP 2001-312063 (Tadayuki, et al.), applied by the Examiner in rejecting claims in the Office Action mailed April 14, 2009;

(A) Additional Comparative Example A

A photosensitive polymer composition was obtained by the same constitution, combined amounts and procedures as in Example 1 on pages 25 and 26 of the specification of the above-identified application, except that bis(2-hydroxy-3-methoxymethyl-5-methylphenyl)methane (compound used in the Examples 1 and 3 in the cited JP 2001-312063) was used in place of 2,2-bis[3,5-bis(hydroxymethyl)-4-hydroxyphenyl]-1,1,1,3,3,3-hexafluoropropane used in this Example 1 on pages 25 and 26 of the specification of the above-identified application.

The obtained photosensitive polymer composition was applied on a rotating silicon wafer by a spinner, and heated and

dried on a hot plate at 120°C for 3 minutes to obtain a coating film of 11.9 μm . An exposure treatment was given to this coating film via a reticle by using an i-line stepper (supplied from Canon Inc.) as an exposure apparatus and changing exposure amounts in the range of 100 to 810 mJ/cm^2 , with an increment of 10 mJ/cm^2 . Then, a paddle development for 80 seconds was performed using an aqueous solution of 2.38% by weight of tetramethyl ammonium hydroxide as a developing solution, and the coating film was washed with purified water to obtain patterns. The proper exposure amount was determined to be 330 mJ/cm^2 by observing the obtained patterns, and the sensitivity was not so high. It was confirmed that the pattern having a good shape down to a dimension of 3 μm was formed by this exposure amount. A film remaining ratio in an unexposed portion was 81%.

(B) Additional Comparative Example B

A photosensitive polymer composition was obtained by the same constitution, combined amounts and procedures as in Example 1 on pages 25 and 26 of the specification of the above-identified application, except that bis(2-hydroxy-3-ethoxymethyl-5-methylphenyl)methane (compound used in the Example 2 in the cited JP 2001-312063) was used in place of 2,2-bis[3,5-bis(hydroxymethyl)-4-hydroxyphenyl]-1,1,1,3,3,3-hexafluoropropane used in this Example 1 on pages 25 and 26 of the specification of the above-identified application.

The obtained photosensitive polymer composition was applied on a rotating silicon wafer by a spinner, and heated and dried on a hot plate at 120°C for 3 minutes to obtain a coating film of 12 μm . An exposure treatment was given to this coating film via a reticle by using an i-line stepper (supplied from Canon Inc.) as an exposure apparatus and changing exposure amounts in the range of 100 to 810 mJ/cm^2 , with an increment of 10 mJ/cm^2 . Then, a paddle development for 80 seconds was performed using an aqueous solution of 2.38% by weight of tetramethyl ammonium hydroxide as a developing solution, and the coating film was washed with purified water to obtain patterns. The proper exposure amount was determined to be 320 mJ/cm^2 by observing the obtained patterns, and the sensitivity was not so high. It was confirmed that the pattern having a good shape down to a dimension of 3 μm was formed by this exposure amount. A film remaining ratio in an unexposed portion was 79%.

5. As can be appreciated by one of ordinary skill in the art, improved or enhanced sensitivity of a photosensitive polymer composition of the type as in the present invention is evidenced by a reduced proper exposure amount.
6. The Additional Comparative Example A and the Additional Comparative Example B in Items 4(A) and 4(B), respectively, had proper exposure amounts of 330 mJ/cm^2 and 320 mJ/cm^2 , respectively, showing that the sensitivity of each was lower, as

compared to the proper exposure amount in Example 1, in paragraph [0087] on page 25 of the specification of the above-identified application, having a proper exposure amount of 280 mJ/cm².

7. From Item 6 in the foregoing, it is appropriate to conclude that photosensitive polymer compositions as in claim 1 in the Amendment filed February 17, 2009, in the above-identified application, including compound (c) thereof, have unexpectedly higher sensitivity than corresponding photosensitive polymer compositions as in JP 2001-312063, having compounds (a) and (b) within the scope of those in claim 1 of the Amendment filed February 17, 2009, but with a compound (c) outside the scope set forth in claim 1 of the Amendment filed February 17, 2009.

The undersigned hereby declares that all statement made herein of his knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine, or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

June 23, 2009
Date

Masayuki Ooe
Masayuki Ooe